SWITCH POINT INSPECTION & WHEEL-CLIMB DERAILMENT PREVENTION

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OUTLINE

1) Derailment cause negotiation
2) FRA Track Safety Standard
3) Three conditions needed for a switch point wheel climb derailment
4) Switch point design features
5) Sample problems
6) Five switch point inspection tips

DERAILMENT CAUSE NEGOTIATION

WHAT DOES THE MECHANICAL DEPT HAVE THAT THE TRACK DEPT DOES NOT?

Gages that determine compliance with wear standards!

Internet photo, “hollow tread wheel gage”

Common wheel wear defects:

- ~~Thin tread~~
- ~~Hollow-worn tread~~
- ~~Thin flange~~
- ~~High flange~~
- Vertical flange

FRA'S TRACK SAFETY STANDARD

FRA Track Safety Standards do not provide much guidance:

§213.135 Switches
(h) Unusually chipped or worn switch points shall be repaired or replaced. Metal flow shall be removed to insure proper closure.

The meaning of "unusually chipped or worn" is in the eye of the beholder. It often depends on the inspector's derailment experience.

SWITCH POINT DERAILMENTS – FRA CAUSE CODES

T311 – switch damaged or out of adjustment

T313 – switch out of adjustment – insufficient anchoring

T314 – switch point worn or broken

T319 – switch point gapped (between switch point & stock rail)

WHICH SWITCH POINT IS OF GREATER CONCERN?

From an FRA Track Safety Standards perspective?

From a derailment risk perspective?

WHAT THREE CONDITIONS ARE PRESENT IN MOST SWITCH POINT WHEEL-CLIMB DERAILMENTS?

1. A gapped, worn or broken switch point

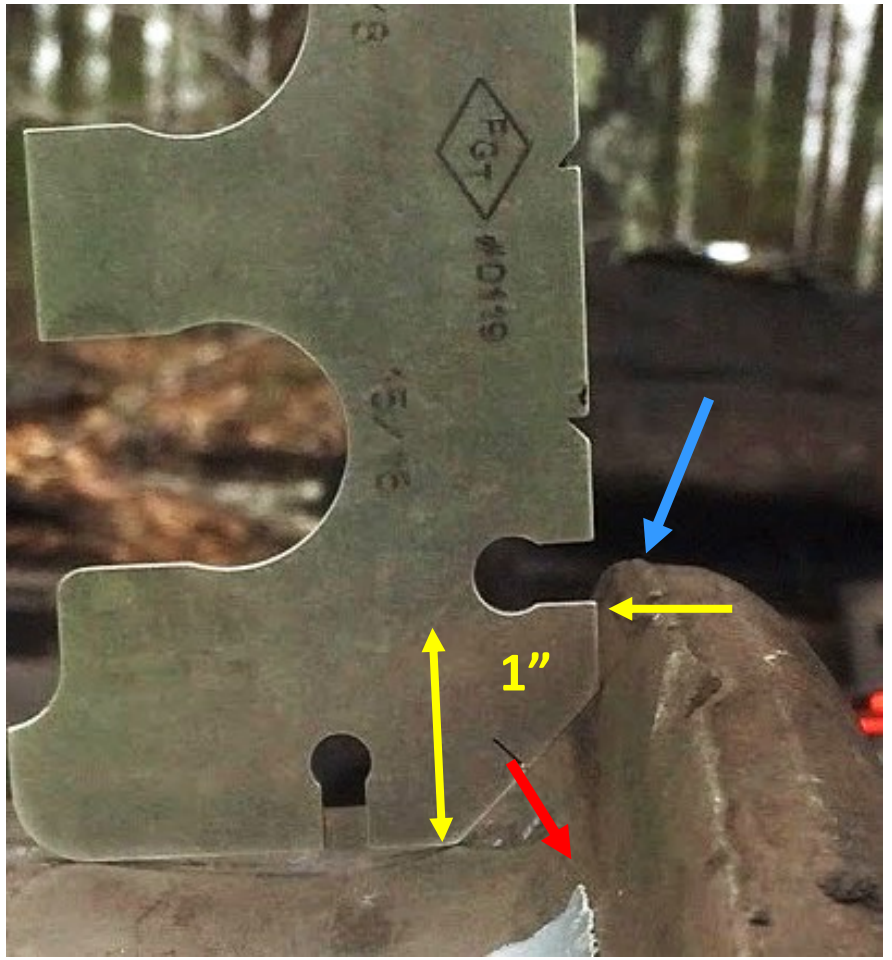
WHAT THREE CONDITIONS ARE PRESENT IN MOST SWITCH POINT WHEEL-CLIMB DERAILMENTS?

1. A gapped, worn or broken switch point

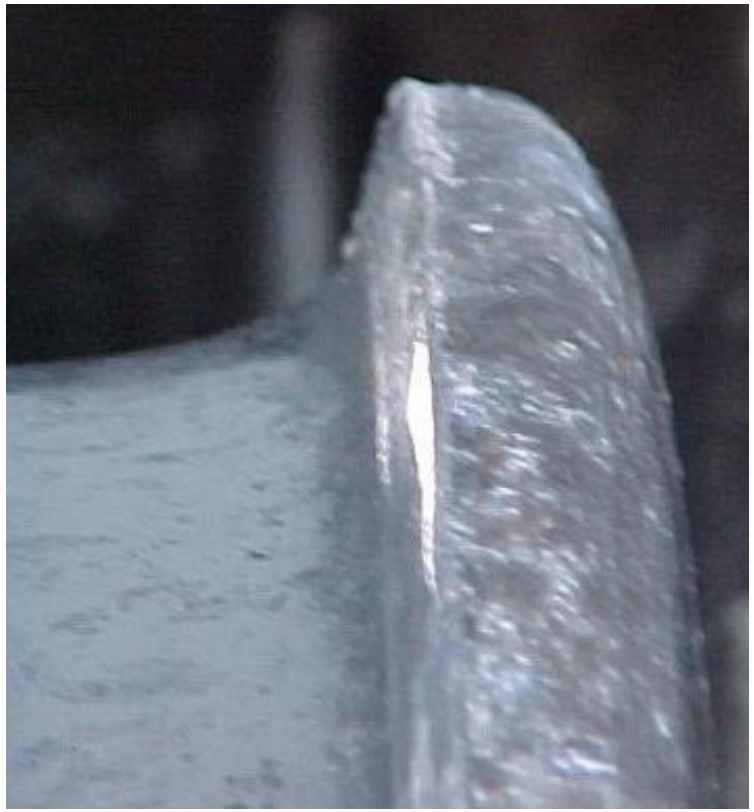
2. A worn wheel – one with a worn flange root and (often) a sharp edge on the tip of the flange

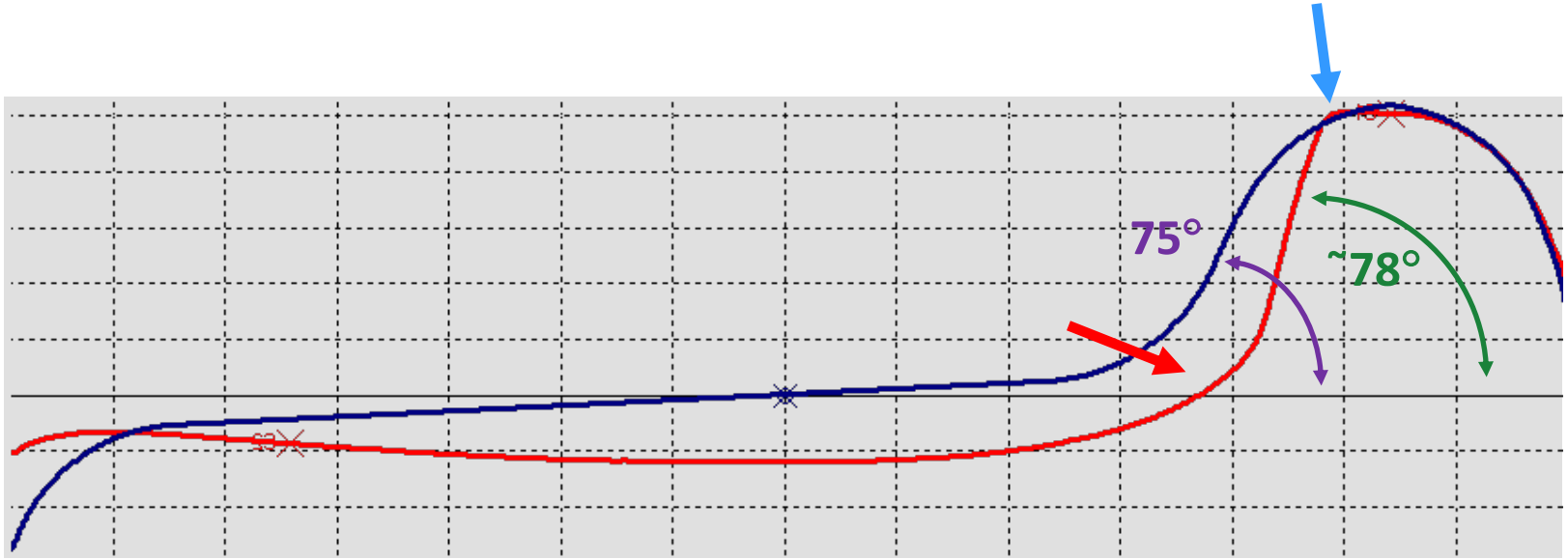
Can a wheel be condemned for a vertical flange?

Yes – but only if the wheel gauge contacts the flange 1” above the tread. Very few wheel flanges achieve 90^{o}.



WHY DOES A WORN WHEEL INCREASE RISK OF WHEEL CLIMB?





A worn flange root allows the flange tip to get much closer to the point

WHAT THREE CONDITIONS ARE PRESENT IN MOST SWITCH POINT WHEEL-CLIMB DERAILMENTS?

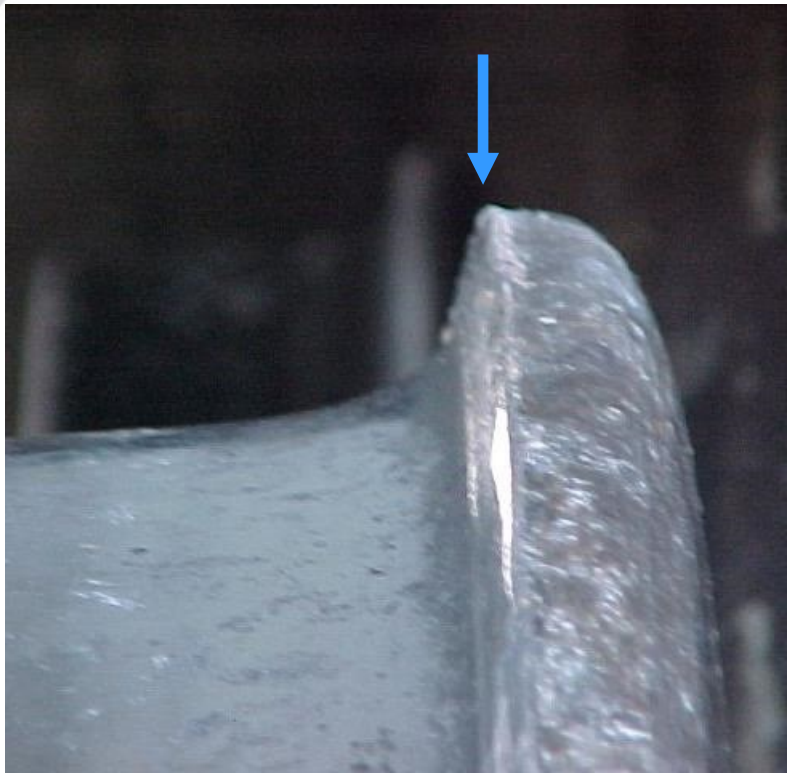
1. A gapped, worn or broken switch point
2. A worn wheel
3. Tracking position – the worn wheel is shifted toward the switch point

DID A WHEEL CLIMB THIS SWITCH POINT?

Three things to note about this switch point:

1) Slight gap
2) Wheel flange contact near the tip
3) Wheel flange mark on top of the point

YES, A WHEEL DID CLIMB THIS SWITCH POINT!

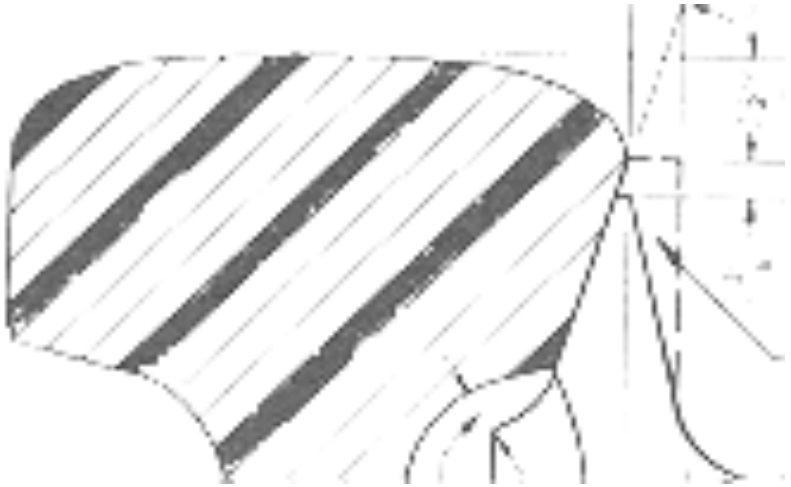


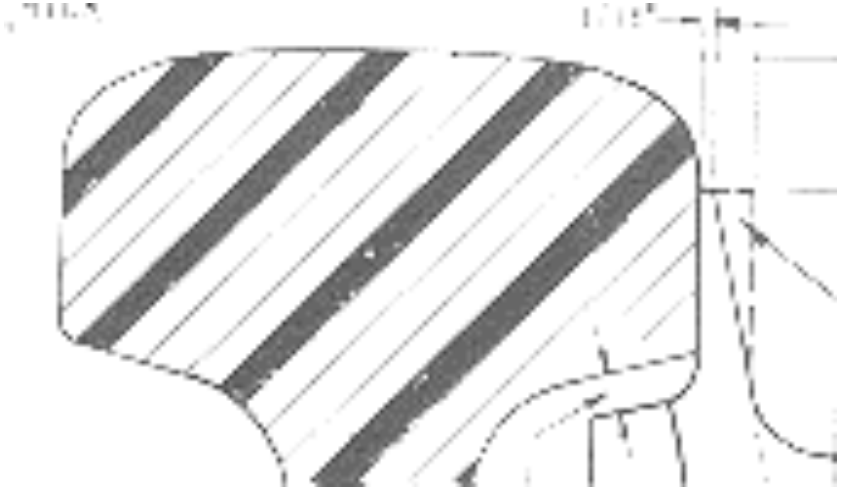
Worn wheel flange

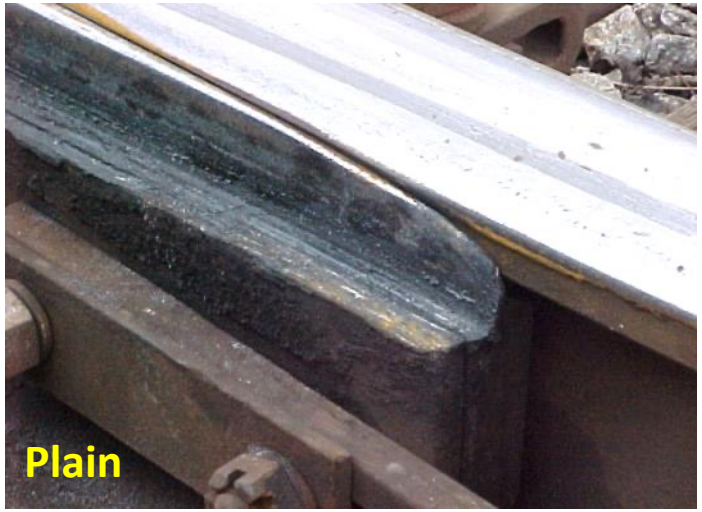
The worn flange is tracking close to the stock rail

We have wheel climb!

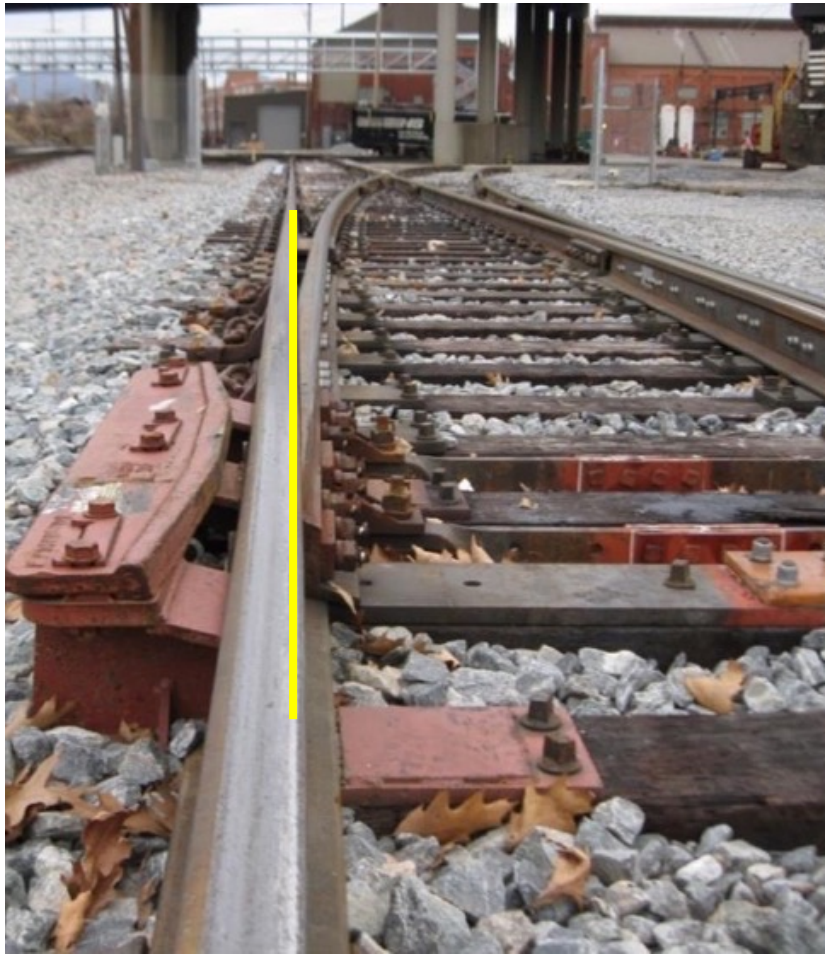
SAMSON (UNDERCUT) VS. PLAIN POINTS







STRAIGHT (NORMAL) VS. REVERSE (DIVERGING) POINTS



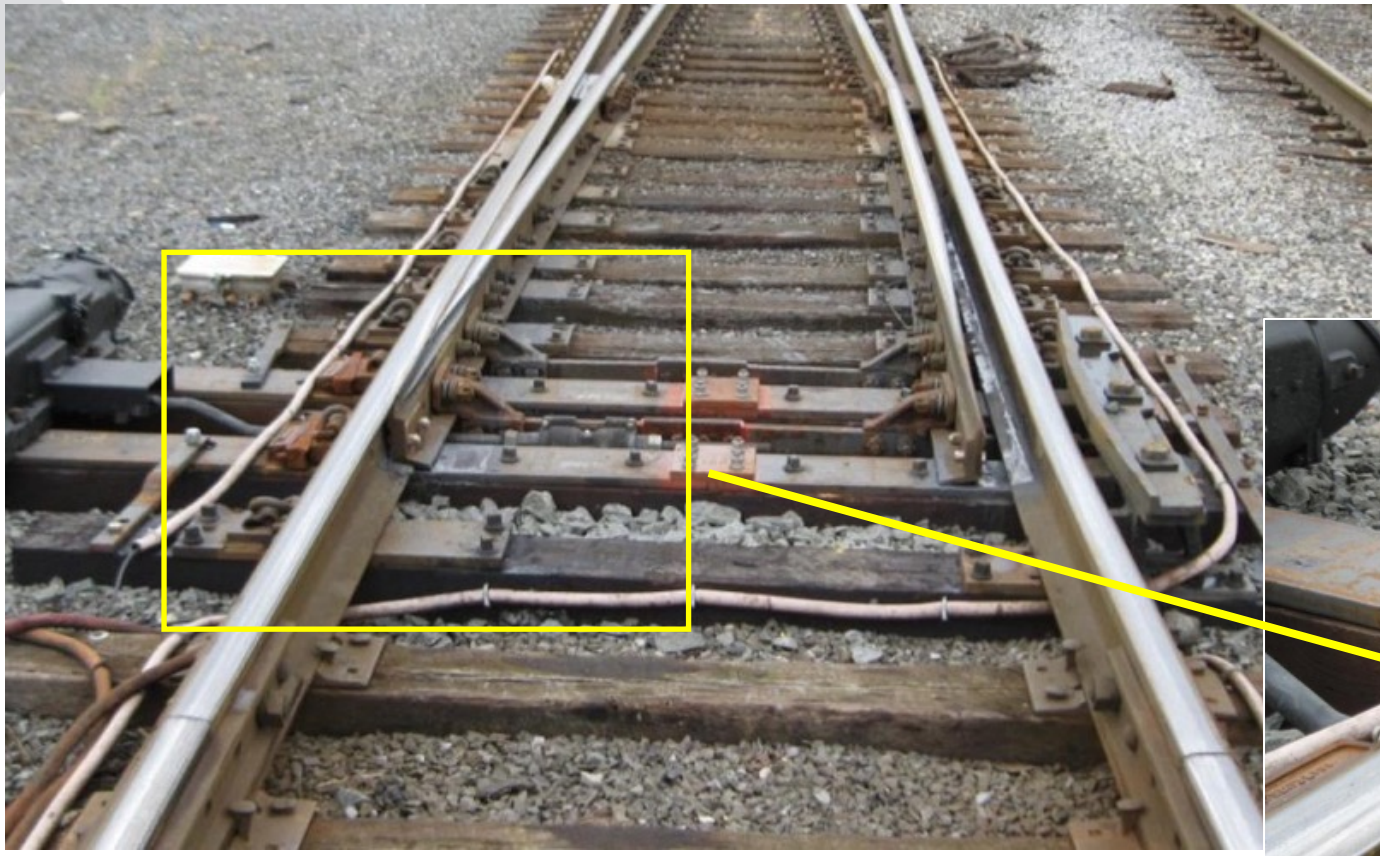
The straight point is tucked behind the bend in the stock rail; the tip of the point is behind the “gage line.”

Flange contact and point wear are less with a straight point.

The reverse point rests against a straight stock rail and, except for the tip, is in front of the “gage line.”

Flange contact and point wear are greater with a reverse point.

WHAT'S WRONG WITH THIS PICTURE?



The protector is on the wrong side - it is protecting the straight point instead of the diverging point

WHAT'S WRONG WITH THIS PICTURE?

You are looking at a bent stock rail and a straight point

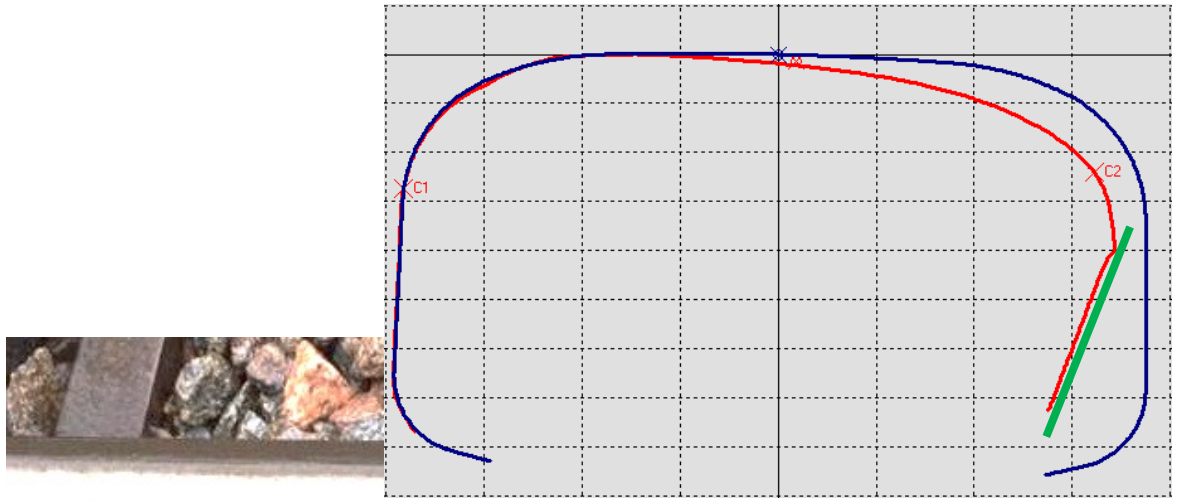
Hint: This is a welded switch point with floating heel block (no bolts connecting point to stock rail).

A: The point was installed too far ahead – the tip of the point is at the stock rail bend!

The point is not protected behind the stock rail bend.

TOP-WORN STOCK RAIL INCREASES RISK OF WHEEL CLIMB

This straight stock rail has both top wear and gage-side wear, which combine to expose an unworn switch point.



AN INDICATION THAT A PROBLEM IS DEVELOPING

Both points show evidence of wheel flange contact at the tip

ANOTHER SWITCH POINT WHEEL CLIMB DERAILMENT

- ✓ Point moderately worn
- ✓ Tracking position - evidence of flange contact at the tip of point
- ✓ Wheel flange worn but not condemnable

NS file photos

ANY CONCERNS WITH THIS SWITCH POINT SECTION?

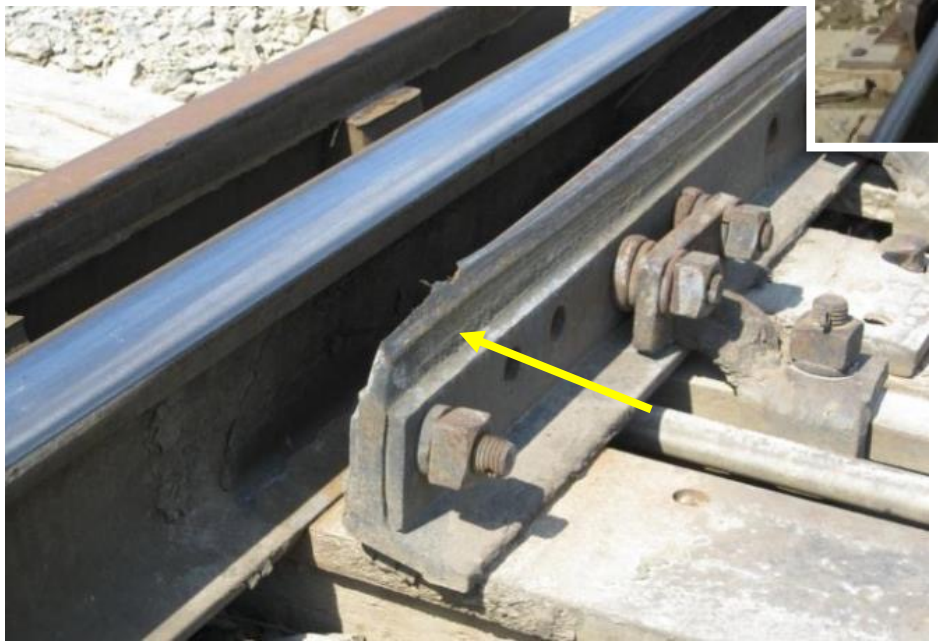
A consequence of poor track surface:
Wheel loading can push the heel down which can cause the front of the point to lift up (relative to the stock rail), increasing the risk of wheel climb.

ANY CONCERNS WITH THIS SWITCH POINT SECTION?

Reason for worry: Point shows wheel flange contact and a side wear.

Mitigating factor: the point protector.

Despite stock rail lip and broken point, this point has little risk of causing a derailment – wheels are not tracking close by.

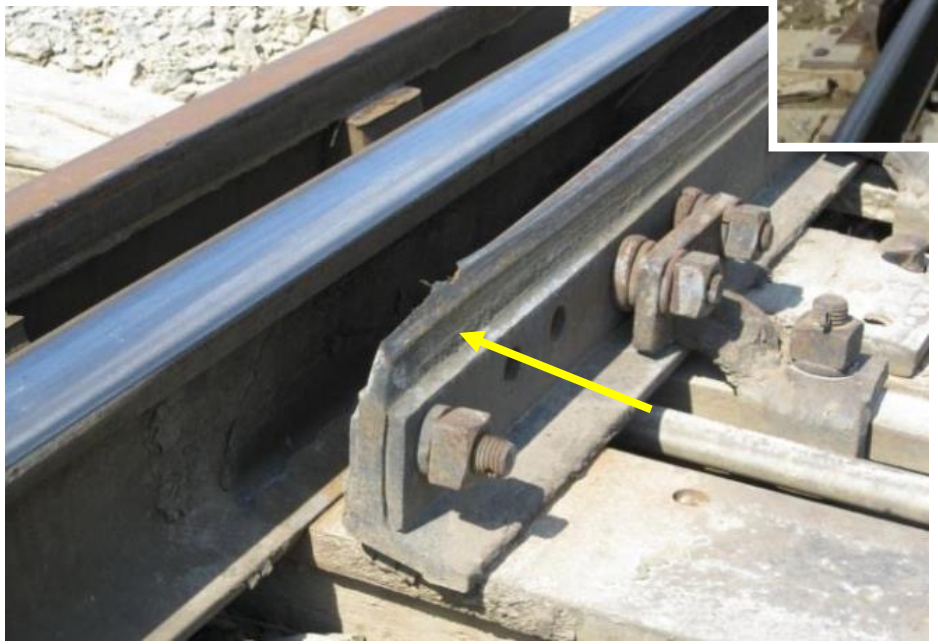


SWITCH POINT INSPECTION TIP #1

1. Operate switch to both sides to observe how the switch point fits up against the stock rail

SWITCH POINT INSPECTION TIPS #2 & #3

2. Look for wheel flange contact at the front of the point



3. Grind stock rail overflow

SWITCH POINT INSPECTION TIP #4

4. Maintain your switch points with worn wheel flanges in mind!
   - Worn flanges are more likely to pick a poor-fitting point
   - Worn flanges are common
   - Most wheels that climb points are not condemnable
   - A good point will accommodate a worn wheel flange

SWITCH POINT INSPECTION TIP #5

What's wrong with this switch stand?

5. Keep "tension" on your switch stand to hold the point tight against its stock rail

QUESTIONS?

The five switch point inspection tips

1. Operate switch to both sides to observe how the switch point fits up against the stock rail.
2. Look for wheel flange contact at the front of the point.
3. Grind stock rail overflow.
4. Maintain your switch points with worn wheel flanges in mind.
5. Keep “tension” on your switch stand to hold the point tight against its stock rail.